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Fatigue Issues for Metropolitan Bus Drivers: Ramifications of Quantitative & Qualitative Research Findings for Safety Management

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ABSTRACT

Metropolitan bus drivers operating in urban areas are exposed daily to a stressful and distracting work environment. To date, there has been a dearth of research exploring whether these factors cause fatigue in this population. The present study aimed to provide insight into metropolitan bus driver fatigue. The study was conducted in two phases. Firstly, focus groups were held at five bus depots an Australian capital city. The findings from these focus groups were incorporated into the second phase, a questionnaire study completed by 249 drivers in the same city. On reviewing the findings of the two phases, several fatigue issues were identified, including unrealistic scheduling and the according inability of drivers to take breaks, and the effects of managerial support. There was a lesser support in the questionnaire for the themes of ticketing policing, passenger interaction, shift irregularity and road user interactions as fatigue factors. The themes of cabin ergonomics and extended shift cycles failed to emerge in the questionnaire phase. Consideration is given as to why such factors are believed by drivers to be significant in increasing their levels of fatigue, and the ramifications of these findings in the context of future transit services management are also discussed.

INTRODUCTION

As fuel prices soar and traffic congestion in Australian cities becomes worse, public transport may become a more attractive option for many commuters. Buses will be one mode of transportation that will carry the extra burden. Despite general recognition that those whom drive these buses daily face a stressful work environment, however, there has been little work done to date which examines the effects of such job demands on metropolitan bus drivers in Australia. This paper seeks to go some way toward filling the knowledge gap in this area by examining the antecedents and effects of driver fatigue in this population.

Though generalising from other heavy vehicle fatigue research provides a starting point, examination of the incident statistics for Australian urban bus drivers provides reason why this population requires specific investigation. The majority of serious bus crashes have been observed to have involved urban drivers travelling standard, short routes (58.7 percent of all bus-related deaths), and often in speed zones of sixty kilometres per hour or less (57.6 percent of all deaths; 70.9 percent of all hospitalisations). These incidents typically involved the presence of another road user, with the point of impact predominantly frontal. The most common times of day for fatal accidents were mid-morning and mid-afternoon (Australian Transit Safety Bureau, 2001). Thus, it can be seen that most heavy vehicle incident research, with its emphasis on issues such as long-haul operating, inverted sleep cycles and loading cargo, clearly does not capture the unique experience of metropolitan bus drivers. Hence, there is significant work to be done in identifying the unique antecedents of incidents in this sector.

The Nature of Fatigue in Metropolitan Bus Driving

One possible contributing factor to stress and fatigue is the unique nature of fatigue experienced by metropolitan bus drivers. Fatigue is difficult to observe and leaves no physical evidence, often leaving its influence to be subjectively inferred and, as a result of the negative connotations involved, routinely underestimated (Arboleda, Morrow, Crum & Shelley, 2003; Summala & Mikkola, 1994). Allowing for these difficulties, fatigue is estimated to have played a role in 10 percent of all incidents that involved heavy vehicle drivers, cumulatively costing the Australian commercial driving industry an estimated $250 million per year (Fatigue Expert Group, 2001; Australian Transport Council, 2003). When it is

further considered that as many as one-third of heavy vehicle drivers consider their performance to be negatively affected by fatigue (Williamson, Feyer, Coumarelos & Jenkins, 1992), the immediate need for further investigation becomes clear.

Fatigue has been posited to be a state highlighted by impaired performance and subjective feelings of tiredness, brought on by factors including inadequate rest, prolonged wakefulness and environmental stressors (Fatigue Expert Group, 2001). Two major physiological factors are postulated to generate fatigue are sleep loss and circadian rhythm disruption (Arrowhead Space and Telecommunications, 1999). Beyond these explanations, other fatigue antecedents observed include time on task, extended concentration and boredom (Rosa, Colligan & Lewis, 1989), as well as stress and various environmental factors (Rydstedt, Johansson & Evans, 1998). Various resulting deleterious effects on driving behaviour identified include impaired reaction times, decreased attention to safety behaviours, reduction in visual scanning behaviour, fluctuations in driving speed, failure to stay within lanes and, ultimately, falling asleep at the wheel (Fatigue Expert Group, 2001). In terms of outcomes, the effects manifest themselves not only through incidents, but also in higher rates of self-reported attentional lapses and near misses (Morrow & Crum, 2004).

In considering unique fatigue antecedents, the level of job stress experienced by drivers may be a significant factor. Urban bus driving has been identified as one of the more stressful occupations (Evans, Johansson & Rydstedt, 1999). This is said to be due to the nature of the work; the conflict of pressures to maintain tight schedules and drive safely, while having little control over their external environment (Gardell, Aronsson & Barklof, 1982). Research suggests that this kind of sustained job strain is significantly related to mental and physical exhaustion in commercial drivers (Karasek, 1979). Therefore, bus driver stress may be expected to be a salient factor in the investigation.

The Present Study

The present study aimed to identify the factors influencing the fatigue levels experienced by metropolitan bus drivers. It attempted to capture the drivers' own perceptions of fatigue factors affecting them by using a two part methodology: first, a series of semi-structured focus groups, and second, a questionnaire quantitatively operationalising and testing the emergent fatigue-related themes. The results of this study have been discussed in light of their ramifications in the context of future metropolitan transit services management.

METHODOLOGY

Five bus depots in an Australian State Capital City public transport network were chosen as targets for focus groups, with each representative of a different set of potential fatigue issues that may affect the wider fleet, such as broken shift scheduling, regional location, longer routes, high density traffic and extended commute times. Participants were volunteers, and included bus drivers, driver trainers, and driver assessors. Each focus group was held on-site and lasted approximately one and a half hours, with the employees remunerated at their standard rate for their participation. Transcriptions of the sessions were then subjected to thematic analysis to identify the emergent themes.

Following analysis of the focus group results, and in consultation with existing research, a questionnaire assessing the fatigue factors was developed. The questionnaire contained dependent variable items relating to sleep, tiredness, alertness, and mental and physical exhaustion (drawn from a fatigue questionnaire developed in Howarth, 1992). The questionnaire was distributed to 3500 bus drivers of a major public transport provider in Australia, with 249 valid responses returned, representing a response rate of 7%.

Respondents were 84.3% male and 14.5% female. The average age was 43.83 years. Average years of education completed was 11.83. Respondents had an average bus driving experience of 9.17 years, and an average driving tenure of 8 years with the current organisation. They worked an average of 45.13 hours per week, over an average of 5.55 shifts. Gaining a clearer picture of the shift patterns worked by the drivers was difficult, given the pattern of shifts worked is subject to regular change and relies in part

on aggregate driving hours over fortnightly and monthly periods. The most common shift type was the broken shift (32.8%), followed by the AM (29.9%), the PM (21.7%) and the holiday relief shift (13.1%). Though the overall response rate to the survey can be regarded as low, management were able to confirm that the demographics reported are representative of the organisation as a whole.

RESULTS

The data was subjected to statistical analysis, with results discussed below.

Driver Fatigue Variables.

Four different driver fatigue variables were used throughout the study. The correlation matrix is displayed in Table 1. Note that, while each of the fatigue variables is significantly correlated to each of the others, the actual correlations are not high enough to mark them as redundant. Hence, tiredness, alertness, mental exhaustion and physical exhaustion, while all indicators of fatigue, are each likely to represent different constructs.

TABLE 1
Correlation Matrix for Fatigue Variables

	Tiredness	Alertness	Mental Exhaustion	Physical Exhaustion
Tiredness	-	-.316**	.447**	.402**
Alertness	-.316**	-	-.224**	-.167**
Mental Exhaustion	.447**	-.224**	-	.561**
Physical Exhaustion	.402**	-.167**	.561**	-

Note: ** indicates significance, $p < .01$

Driver Tiredness & Concern Variables.

Support was found for the notion that driver concern variables affected level of self-reported driver tiredness. A multiple regression was carried out with tiredness at end of shift as the dependent variable and the following variables as predictors: cash handling, passenger interaction, scrutiny from passengers, unavailability of breaks, tight schedules, late running, high-density traffic, traffic fluctuations, longer routes, cabin ergonomics, interaction with management, interaction with Customer Service Consultants (commonly referred to as CSCs; essentially field supervisors), and broken shift breaks. The corresponding model was significant and accounted for 19.60% of the variance, $F(13, 176) = 3.31$, $p < .001$. Significant predictors were concerns over the unavailability of breaks (3.96% of the variance, $\beta = .252$, $p < .005$), tight schedules (1.46% of the variance, $\beta = -.177$, $p < .10$), longer routes (1.49% of the variance, $\beta = .168$, $p < .10$), interaction with management (1.61% of the variance, $\beta = .160$, $p < .10$), and broken shift breaks (2.89% of the variance, $\beta = .186$, $p < .05$).

Driver Alertness & Concern Variables.

Support was found for the notion that driver concern variables affected level of self-reported driver alertness. A multiple regression was carried out with alertness at end of shift as the dependent variable and the same concern variables as featured above. The corresponding model was significant and accounted for 11.40% of the variance, $F(13, 175) = 1.74$, $p < .10$. The significant predictor was concern over high traffic density (2.19% of the variance, $\beta = -.243$, $p < .05$).

Driver Mental Exhaustion & Concern Variables.

Support was found for the notion that driver concern variables affected level of self-reported driver mental exhaustion. A multiple regression was carried out with mental exhaustion at end of shift as the dependant variable and the same concern variables as featured above. The corresponding model was significant and accounted for 23.30% of the variance, $F(13, 176) = 4.10$, $p < .001$. Significant predictors were concerns over the unavailability of breaks (2.34% of the variance, $\beta = .194$, $p < .05$), high traffic density (1.28% of the variance, $\beta = .186$, $p < .10$), and broken shift breaks (2.43% of the variance, $\beta = .171$, $p < .05$).

Driver Physical Exhaustion & Concern Variables.
Support was found for the notion that driver concern variables affected level of self-reported driver physical exhaustion. A multiple regression was carried out with physical exhaustion at end of shift as the dependent variable and the same concern variables as featured above. The corresponding model was significant and accounted for 24.20% of the variance, $F(13, 176) = 4.33$, $p < .001$. Significant predictors were concerns over handling cash (2.07% of the variance, $\beta = -.197$, $p < .05$), interaction with passengers (3.20% of the variance, $\beta = .284$, $p < .01$), the unavailability of breaks (1.39% of the variance, $\beta = .149$, $p < .01$), fluctuating traffic (1.77% of the variance, $\beta = .218$, $p < .05$), and interaction with management (2.72% of the variance, $\beta = .209$, $p < .05$).

Driver Satisfaction with Managerial Support & Fatigue.
Support was found for the notion that lower driver satisfaction with managerial support predicts higher driver fatigue. A one-way ANOVA was conducted with satisfaction with level of managerial support as the independent variable, analysing tiredness at end, alertness at end, mental exhaustion at end and physical exhaustion at end at the levels of satisfied, dissatisfied and no opinion, with significant differences found in tiredness, alertness, mental exhaustion and physical exhaustion at end of shift between satisfaction levels, $F(2, 238) = 3.349$, $p < .05$, $F(3, 235) = 3.841$, $p < .05$, $F(3, 237) = 5.422$, $p < .001$, and $F(3, 238) = 4.196$, $p < .05$ respectively, but not in alertness or physical exhaustion, $F(3, 234) = 1.912$, $p > .005$, and $F(3, 237) = 1.713$, $p < .05$ respectively. Contrasts revealed that tiredness at end was significantly higher in dissatisfied drivers ($\underline{M} = 3.81$) than those who were satisfied with managerial support ($\underline{M} = 3.38$), $t(238) = -2.392$, $p < .05$. Similarly, contrasts revealed that mental exhaustion and physical exhaustion at end was significantly higher in dissatisfied drivers than those who were satisfied with managerial support ($\underline{M} = 3.51$ v $\underline{M} = 2.84$, and $\underline{M} = 3.27$ v $\underline{M} = 2.76$ respectively), $t(237) = -3.274$, $p < .001$ and $t(238) = -2.555$, $p < .05$ respectively. Also consistent with these trends, alertness at end was significantly lower in drivers dissatisfied with managerial support ($\underline{M} = 2.64$) than those who were satisfied with it ($\underline{M} = 2.98$), $t(235) = 1.828$, $p < .01$.

Overtime & Fatigue.
No support was found for overtime affecting driver fatigue. A one-way ANOVA was conducted with overtime status as the independent variable, analysing tiredness at end, alertness at end, mental exhaustion at end and physical exhaustion at end at the levels of no regular overtime worked and regular overtime worked. No significant differences in tiredness, alertness, mental exhaustion or physical exhaustion at end of shift between overtime status was found, $F(2, 238) = .184$, $p > .10$, $F(2, 235) = .038$, $p > .10$, $F(2, 237) = .707$, $p > .10$, and $F(2, 238) = .177$, $p > .10$ respectively. Further, bivariate correlation failed to find a significant relationship between amount of overtime and tiredness at end, alertness at end, mental exhaustion at end and physical exhaustion at end, $r = .141$, $p > .10$, $r = -.021$, $p > .10$, $r = .072$, $p > .10$, and $r = -.018$, $p > .10$ respectively.

Shift Regularity & Fatigue.
Some limited support was found for notion that drivers who drive irregular shifts experience significantly greater driver fatigue. A one-way ANOVA was conducted with shift regularity as the independent variable, analysing tiredness at end, alertness at end, mental exhaustion at end and physical exhaustion at end at the levels of regular and irregularity. Significantly lower levels of alertness at end of shift were found in those who worked irregular shifts, $F(1, 238) = 6.115$, $p < .05$. However, no such significant differences were observed for tiredness, mental exhaustion and physical exhaustion at end, $F(1, 238) = .546$, $p > .10$, $F(1, 237) = .212$, $p > .10$ and $F(1, 238) = .040$, $p > .10$ respectively.

DISCUSSION

Metropolitan bus drivers operate in environment identified as demanding, stressful and fraught with distractions. The purpose of this study was to provide a preliminary insight into the effects of various job factors on the fatigue experienced by metropolitan bus drivers, assessing, from the drivers' own points of view, the factors which they consider most instrumental in contributing to their fatigue-related impairment.

Investigation of the factors involved a two phase methodology. Firstly, semi-structured focus groups were held with bus drivers from five metropolitan bus depots in an Australian State capital city. The emergent themes from these focus groups were then operationalised into questionnaire variables, and tested against the fatigue dimensions of tiredness, alertness, and mental and physical fatigue. The assessment of these themes yielded mixed results, as discussed in detail below.

Support from Management.
There is strong evidence to suggest that experiences with management represent an important factor in drivers' experiences with fatigue. Level of support for the driver displayed by management was a factor mitigating fatigue reported at all depots. Drivers reported that managerial support was important both in reducing the amount of stress experienced and carried by drivers following negative job episodes, as well as in predicting the likelihood that a driver would feel comfortable taking steps to prevent driving fatigue. This was supported quantitatively, with higher levels of driver concern with management interactions predicting increased levels of tiredness and physical exhaustion, and dissatisfaction with managerial support found to heighten levels of tiredness, mental and physical exhaustion and lower levels of alertness.

The idea that managerial attitudes affect safety climate in organisations has been robustly supported across industries, with the heavy vehicle sector being no exception (Arboleda et al, 2003; Rosekind, Neri & Dinges, 1997). A problematic theme across heavy vehicle management is balancing the competing priorities of supporting safe driving practices and the enforcing of rigid schedules (Arboleda et al, 2003). In the urban transit sector, with its emphasis on rigid timeframes, drivers may come to consider their well-being as regarded by management as secondary to efficiency of operations. Metropolitan transport represents an extreme of this situation, where even minor late running has wide-ranging effects on ability to meet targets. Here, drivers operating under direction to serve both safety and schedule are likely to experience stress in reconciling the outcomes, no doubt exacerbated by an industry communication style characterised as authoritative, confrontational, blaming and strictly task-focused (Fatigue Expert Group, 2001). The pressure the drivers perceive from management to meet these expectations results in a build up of stress, and a corresponding increase in fatigue (Fatigue Expert Group, 2001).

Ticketing and Related Issues.
Some evidence was found to flag ticketing and related issues as having some effect on fatigue. In the focus groups, drivers suggested that the practice of issuing tickets, checking concessions, handling cash and validating passes at every stop was often cognitively draining, made worse by the stress of balancing the competing priorities of revenue protection and providing safe and efficient service.

While a necessity under current industry practices, this 'policing' is often cited by drivers as one of the more tiring and stressful parts of their role (Rydstedt, Johansson & Evans, 1998). Due to their cognitively involving and unpredictable nature, as well as their frequency, these tasks can divert significant cognitive and attentional resources away from driving, resulting in driver fatigue (Evans et al, 1999). Interestingly, however, the questionnaire's ticketing-related variables did not totally reflect these insights, with concern over handling cash and passenger interaction seen to have greater effect on physical rather than mental exhaustion.

The finding that ticketing and related issues may be a source of fatigue is again tied to role conflict, this time that of balancing 'policing' with driving. Though the policing aspect of the job may for the most part be routine, the addition of these tasks on top of the driving-related stress is likely to add to the drivers' cognitive load (Duffy & McGoldrick, 1990). Given the highly repetitious nature of these tasks, the driver may not experience acute mental stress, but the chronic nature of the interaction is likely to become tiring over the day. This fits with the finding that fatigue caused by policing matters was more likely to manifest itself as physical tiredness, with chronic low-level stressors previously being linked to physical complaints and exhaustion (Rydstedt et al, 1998).

Interaction with Passengers.
Some evidence was found that indicates passenger interactions influence driver fatigue, rather than the mere feeling of being observed in one's passengers. All five depots nominated driver interactions with passengers, including those of a routine and aggressive nature, as a factor affecting fatigue. Such interaction was said by drivers to cause fatigue through distraction and, in the cases of aggression, acute stress. The questionnaire demonstrated that this fatigue was manifested in physical exhaustion. This finding fits conceptually with the above section on ticketing; the interaction with passengers is highly repetitious, and may manifest itself more as a low-level physical stressor than an acute mental stress (Rydstedt et al, 1998).

Cabin Ergonomics.
Chronic physical discomfort stemming from cabin design, though highly emergent in focus groups, failed to produce the expected quantitative links with fatigue. Though focus group drivers implicated a number of problematic design features, including exposure to heat, noise and glare, inadequate thermostatic control, and neck, back and shoulder pain generated from seating fit-out, these failed to demonstrate any links to fatigue as operationalised in the questionnaire.

These findings are somewhat surprising, as many of these factors have previously been linked to fatigue in the wider heavy vehicle ergonomics literature. For example, continuous exposure to chronic lower back pain, heat, noise and vibration have been seen to result in elevated levels of physical fatigue over time, with associated deleterious effects on driving performance (Nakata & Nishiyama, 1998; Wylie, Shultz, Miller, Mitler & Mackie, 1996). The failure here may be due to problems operationalising the variable; there are a wide range of ergonomic factors that may concern drivers, and there is likely to be significant debate on what the relevant factors are. Alternatively, it may be that the cabin design of buses used in Australia is adequate for most drivers, or that the opportunity for more frequent breaks provide more relief than that available to long-haul drivers.

Tight Route Schedules.
Strong support was found linking tight route schedules to bus driver fatigue. Focus group drivers at four of the five depots cited unrealistically tight route schedules, and a corresponding restricted availability of shift breaks, as being significant factors affecting fatigue levels. In the questionnaire, this concern over tight scheduling was significantly related reports of driver tiredness. The corresponding unavailability of breaks is perhaps more telling, however, adding significantly to driver's experiences of tiredness, and mental and physical exhaustion.

The nature of urban transit means that drivers are often required to adhere to timetables that are difficult to achieve consistently, leaving little margin for delays due to variations in traffic and environment. Bus drivers have previously nominated such inflexible schedules as a primary stressor involved in transit driving (Duffy & McGoldrick, 1990). Furthermore, the restricted availability of breaks is itself significant; even after relatively short time on task, performance deficits have been observed among heavy vehicle drivers (Carrere, Evans, Palsane & Rivas, 1991). In bus drivers, it is likely that this reduction in task performance capacity is due to a combination of physical fatigue and stress accumulated from an inability to address hunger, thirst, stretching and toilet needs (Fatigue Expert Group, 2001).

Shift Irregularity.
Some evidence was found for the effects of shift irregularity on fatigue. The focus groups demonstrated that drivers perceived a relationship between fatigue and accumulated sleep debt, with the majority of drivers attributing some impairment to working variable shifts week to week. Even minimal differentials were suggested to have significant ramifications for drivers' daily routine, demonstrated in changing meal times, sleep cycles and altered work/life balance, which were reported to spill over into driver fatigue levels. To this end, the shift irregularity was found only to be linked to decreased alertness. These results are somewhat congruent with those in long-haul transit research, where drivers shift variability is routinely seen to lead to fatigue and the accumulation of sleep debt (Morrow & Crum, 2004). That the results are not as dramatic in scale may reflect the lesser degree of shift variation in metropolitan transit sector.

Of concern, however, is that the focus groups revealed that the more inexperienced 'scrap' drivers are likely to be exposed to more frequent and significant variability, yet almost certainly lack the experience to identify the resulting symptoms of fatigue (Arrowhead Space and Telecommunications, 1999). Hence, the practice of maintaining a corps of inexperienced drivers who routinely work irregular shifts may create drivers more at risk to fatigue.

Extended Shift Cycles.
Though identified as a fatigue factor by focus group drivers, the effects of extended shift cycles were not supported in the quantitative investigation. In the jurisdiction surveyed, drivers report being given the option of working cycles of shift cycles up to 12-days on, 2-days off. Drivers at depots where this was available reported that, while different drivers are differentially equipped to handle extended work periods, the act of working twelve continuous days generally resulted in the accumulation of fatigue and impaired driving performance. However, both extended shift cycles and overtime failed to demonstrate the expected significant relationships with the fatigue variables in the questionnaire results.

These results were surprising, given that extended schedules and increased overtime hours have been demonstrated across many different kinds of shift work to facilitate significant sleep debt (Karasek, 1979). However, that they did not reveal themselves as a significant factor here may have been due to an artefact of questionnaire wording. Due to hours of service restrictions, some drivers may work a greater number of days consecutively than others, but ultimately work the same overall number of hours. This means that, when asked how many shifts they work per week, drivers would be forced to give an average figure, which would effectively disguise any variance. Similarly, overtime carries with it specific connotations in driving industries, where it is linked to penalty rate conditions. Alternatively, it could be that the effects of this fatigue are countered in metropolitan bus drivers by the relatively greater accessibility of short work breaks or the self-selection of more fatigue resilient drivers into this shift pattern.

Interactions with Other Road Users.
Some support was found for concern stemming from other road users influencing fatigue. Many of the focus group drivers reported that the lack of consideration from other road users was partially responsible for the fatigue they experienced. Such fatigue was reported to stem from stress, both that of ensuring passenger safety and that of maintaining the route schedules, with chief offenders identified as motorists who fail to give way, vehicles parking in bus lanes, taxis and cyclists. To this end, concern with high volume traffic raised mental exhaustion levels and reduced alertness, and concern with the fluctuating traffic volume lead to physical exhaustion. It has been suggested that the practice of routinely dealing with unpredictable, heavy traffic represents a chronic stressor that is likely to manifest itself through accumulated fatigue effects (Carrere et al, 1991). This consequence is hypothesised to happen both as a result of having to maintain intense concentration for extended periods, and the build up of stress resulting from aggravation and frustration (Evans et al, 1999). Furthermore, interactions with other road users are likely to play a part in fuelling the fatigue effects associated with tight route schedules (Rydstedt et al, 1998).

MANAGING FATIGUE FOR METROPOLITAN TRANSIT SAFETY

This investigation of metropolitan bus transit operations has demonstrated that a number of factors associated with the job have an adverse effect on the fatigue levels of their drivers, an outcome which has serious implication for the safety of the operations as a whole. However, it is recognised that not all the blame for these factors lay at the feet of management. Certain factors, such as interactions with other road users, interactions with passengers and 'policing' tasks, stressful and fatiguing as they may be, are intrinsic to the job. The findings do, however, raise a number of factors which are under the employers' control.

The results of the study indicate that perceptions of managerial support are one of the stronger factors influencing bus driver fatigue.

This especially true when the 'conflicting goals' nature of work is considered. Drivers reported feeling both responsible for maintaining schedule and upholding safety. However the restrictive scheduling patterns employed in the industry, coupled with the task-focused nature of management communication (Fatigue Expert Group, 2001), means that, in reality, the pressure is placed on the driver to place the former above the latter. This is a theme often repeated is heavy vehicle management, with the corresponding stress shown to manifest itself in fatigue and impaired driver performance (Arboleda et al, 2003; Fatigue Expert Group, 2001). In such a setting, it is not difficult to see why drivers report a lack of managerial support.

These findings suggest that management could go some way toward alleviating the burden on drivers by demonstrating a commitment to driver safety. Management's commitment to safety and their true perceptions of the value of employees are demonstrated by the working environment they provide. For example, a recent study by DeJoy, Schaffer, Wilson, Vanderberg and Butts (2004) found that employee perception of safety climate was heavily influenced by not just by policies and programs, but also by working conditions and general organisational climate. By focusing only on deadlines, perpetuating unrealistic schedules, restricting breaks and communicating in strictly task-focused terms, management conveys to the driver that their principle interest is in performance over safety. Working with drivers to work out a more flexible, more realistic approach to scheduling and work practice is likely to imbue them with a more favourable appraisal of management's commitment to safety (Dedobbeleer & Beland, (1991). In turn, this is likely to bolster perceptions of managerial support and, accordingly, provide a buffer against driver stress and fatigue (Arboleda et al, 2003).

CONCLUSION

This study was successfully able to identify a number of fatigue factors relevant to metropolitan bus drivers. Two findings in particular stand out: fatigue related to unrealistic scheduling and the effect of managerial support on fatigue. As discussed, it is interesting to consider these factors together may provide insight into employee's perceptions of management's real priorities and its true commitment to safety.

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